

SYLLABUS FOR B.E/B.TECH in MECHANICAL & AEROSPACE ENGINEERING

Introduction to jet propulsion: The Gas Turbine Engine development for jet Propulsion; Jet engine performance parameters: Thrust, SFC, Efficiencies; Simple Turbojet and Reheat engines: Low and High bypass Turbofan engines; Single and Multi-spool Gas Turbine based propulsive devices

Real Cycle Thermodynamic Analysis: Ideal and Real Brayton cycles; Jet engine cycles for aircraft propulsion; Cycle components and component performance: Intake, Compressors & Turbines, Combustion chamber, Afterburner, Nozzle; Analysis of engine real cycles: Turbojet cycle, Reheat engine cycle, Turbofan engine cycle, Turboprop Engines;

Fundamentals of Rotating Components: Thermodynamics of Compressors and Turbines; Development of parameters for compressors and Turbines. Compressors and Turbines: Axial and centrifugal Compressors: A simple two-dimensional analytical model; 2-D (cascade) analysis; Loss and Blade performance estimation; Simple Free Vortex theory; Single and Multi-stage Axial compressor characteristics; Elements of centrifugal compressor; Inlet Duct; Impeller; Slip factor and Concept of Rotor enthalpy; Centrifugal Compressor Characteristics: Surging and Choking.

Axial and Radial flow turbines: Introduction; Turbine stage: Turbine Blade 2-D (cascade) analysis; Work Done, Degree of Reaction, Losses and Efficiency;

Combustion Systems: Introduction: Various types of combustion chambers in aircraft engines; Combustion Mechanism and Important Combustion parameters; Development of a practical combustion system and design parameters; Pressure losses; Combustion efficiency;

Intakes and Propelling Nozzles: Intakes: Requirements of an Intake for Power plant: Transport, Military Aircraft; Subsonic Intakes, Transonic and Supersonic Intakes; Engine Installed Performance, Sizing & Matching: Introduction to engine component sizing; Installed Performance of Engine;

Fundamentals of wind tunnel design – introduction, general considerations, general design procedure, main design criteria, wind tunnel component specification, design of various components of wind tunnel – test chamber, contraction, settling chamber, diffuser, power plant, turning vane, fan and drive system, safety net design

Force measurements and measuring systems, Multi component internal and external balances, Pressure measurement system, Steady and Unsteady Pressure, single and multiple measurements, Velocity measurements, Intrusive and Non-intrusive methods, Flow visualization techniques, surface flow, oil and tuft, flow field visualization, smoke and other optical and nonintrusive techniques.